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Background Paper Forum Climate Economics 9

Chances and Obstacles to Strengthening the Paris Agreement – The Case of Resource-Rich Countries

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Preface

This background paper for the Forum Climate Economics 9 is based on current research projects from the BMBF funding priority *Economics of Climate Change*. The projects deal with challenges and chances that climate protection and the Paris Agreement entail on an international level. The background paper presents scientific findings that focus on the fundamental challenges resource-rich countries face with respect to decarbonizing their economy. It shows a rather skeptical assessment of the current climate ambition levels of many of these countries as well as of the expectations with respect to reaching not only the current NDCs but also climate neutrality in 2050. To overcome their resource dependencies, these countries need economic perspectives beyond fossil fuel exports. Economic diversification can be a means to reduce the dependency and volatility risk from the resource sector and to profit from higher value added in, for example, manufacturing. Different policy options are presented that aim at incentivizing higher climate ambitions and address the demand as well as the supply of fossil fuels. Especially low-income resource-rich countries will, however, need further measures to enable and incentivize them to increase their climate ambition.

The Forum Climate Economics is a series of events of the *Dialogue on the Economics of Climate Change* on current topics of climate and energy policy. As a platform for intensifying the exchange between science and practice, the Dialogue accompanies the BMBF funding priority *Economics of Climate Change* with its currently 29 projects on economic aspects of climate change. This background paper is part of the activities of the theme "International Climate Policy". Four projects of the funding priority have contributed to this paper in collaboration. They organize the Forum Climate Economics 9 under the auspices of ifo Institute – Leibniz Institute for Economic Research at the University of Munich.

The authors would like to take this opportunity to thank the participating projects of the network Economics of Climate Change for their active support. Together, we discussed the structure of the background paper and colleagues from the different projects contributed with research results and commented on the drafts. In addition, we would like to thank Prof. Gernot Klepper, PhD and Dr. Christine Merk from the Kiel Institute for the World Economy (IfW) for their additions and comments. To them and the other members of the team at the IfW, especially Franziska Weeger, Dr. Lena-Katharina Bednarz, and Defne Akin, also a heartfelt thank you for coordinating the Dialogue on the Economics of Climate Change.

CONTRIBUTING PROJECTS OF THE NETWORK ECONOMICS OF CLIMATE CHANGE

FoReSee Fossil Resource Markets and Climate Policy: Stranded Assets, Expectations and the Political Economy of Climate Change
| ifo Institute | DIW Berlin | Humboldt University Berlin

CarPri Carbon Pricing after Paris
| Kiel Institute for the World Economy | Energy Modelling Forum
| Carl von Ossietzky University Oldenburg

InFairCom Incentives, Fairness and Compliance in International Environmental Agreements
| ZEW Mannheim | Bochum University of Applied Sciences | IÖR Dresden
| Leipzig University of Applied Sciences

COMPLIANCE The Economics of International Climate Policy Compliance: Monitoring, Reporting, Verification and Enforcement
| ZEW Mannheim | Heidelberg University | University of Kassel
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Chances and Obstacles to Strengthening the Paris Agreement – The Case of Resource-Rich Countries

Content

1. INTRODUCTION

To reach the targets of the Paris Agreement and limit global warming to well below 2 °C above pre-industrial levels, the world has to become greenhouse gas neutral at the latest in the second half of the century. This requires broad international participation and adequate collective ambition in reducing greenhouse gas emissions (GHG). While the Paris Agreement is certainly successful in terms of participation (189 countries covering 94.6 % of global CO_2 emissions have joined the Agreement), its bottom-up approach where countries agreed to submit voluntary targets (the national determined contributions – NDCs) has so far led to inadequate ambitions. There are also doubts as to whether the so-called ratchet mechanism (Clémençon, 2016) where all Parties in the Agreement are supposed to steadily increase their ambition level every 5 years within a regular evaluation process, will eventually lead to the necessary emission reductions (Mehling et al., 2018).

Global greenhouse gas neutrality implies that the global use of fossil fuels (coal, natural gas, oil) is phased out almost completely or at least reduced drastically, depending on the use of carbon capture and storage (CCS) and negative emission technologies (NETs). Focusing on reserves[1], McGlade and Ekins (2015) calculated that 35 % of the global oil reserves, 52 % of the global gas reserves and a staggering 88 % of the global coal reserves would have to stay in the ground if a 2 °C target is to be met. This implies that countries that are endowed with large amounts of fossil fuel resources and/or that generate significant shares of the national income through selling fossil fuels on world markets are severely affected if greenhouse gas neutrality is to be reached. Opposition against strict climate targets and low national ambitions would thus not be

1 Reserves are defined as those resources in the ground that can be recovered with current technologies at current prices. In other words, they are a (small) subset of the total resource base in the ground.

a surprise. Yet, these so-called "resource-rich countries" are an extremely diverse group, ranging from industrialized countries such as Norway, Canada and the USA, to high GDP per capita developing countries such as Saudi Arabia and Qatar and poor countries in development such as the Republic of the Congo, Timor-Leste, and many others. They have in common that they have a high share of resource rents in their GDP, their state budget, and/or their export revenues – which is why they are often also classified as "resource-dependent". In order to reach the targets of the Paris Agreement the political and economic conditions and interests of these countries constitute an important determinant that needs to be considered in current and future global joint mitigation activities.

In this paper, we aim to specify the problems faced by resource-rich countries in the context of global climate policy. We analyze whether their ambition level in the Paris Agreement is especially low and whether ratcheting up can be expected, and we identify economic perspectives for these countries beyond fossil fuels. From the perspective of the rest of the world and in particular Europe and Germany, a crucial question is how to incentivize these countries to increase their ambition levels and to support their transition into a post-fossil world. This is addressed in our last section. Our paper builds, among others, on the results of different projects funded within the research program on the economics of climate change by the German Ministry of Education and Research.

2. PROBLEMS FACED BY RESOURCE-RICH COUNTRIES

In the following, we give an overview of the negative economic effects of resource wealth that the literature has identified. At the same time, we aim at identifying why it is harder to engage resource-rich countries in ambitious climate policy than other countries. Yet, it must be borne in mind that resource-rich countries are a very heterogenous group. While the most dependent, in terms of export share, fossil rents in GDP and fiscal resource dependency are low-income countries (**Table 1**), many of the large fossil producers are high-income countries (**Table 2**).

The term "resource dependency" indicates the importance of fossil fuels for many resource-rich countries. In particular, low-income resource-rich countries strongly depend on the revenues from resource exports and could be thrown back decades in their economic development without fossil fuel revenue (e.g. Bos and Gupta, 2019). But losing revenues from fossil fuel extraction would significantly affect the GDP in higher-income countries as well. Results from a multi-model study on the Paris Agreement (Böhringer et al., 2021) which are depicted in **Figure 1** show that Russia and the Middle East would suffer by far the most in terms of GDP/welfare losses already by 2030 if global demand for their resources were to fall because of the emission reductions which are currently committed in the Nationally Determined Contributions. This effect will become even more relevant if stricter targets, in line with the 2 °C target, are implemented. In this case, further resource-rich countries/regions (e.g. Middle East, Russia) would have above average welfare costs.

Large fossil resource rents are not always an economic blessing for a country. These rents have created so-called "rent-seeking" behavior. The power of certain actors in the fossil fuel sector of these countries have led to poor institutions with little democratic or transparent traits. This phenomenon is at the core of the resource

TABLE 1: SELECTED INDICATORS FOR FOSSIL FUEL DEPENDENCY AND TOP 10 COUNTRIES IN 2018

	Share of fuels in exports		Share of fossil rents in GDP		Share of oil rents in GDP		Fiscal resource dependency 2015-2018: Share of state budget from fossil revenues	
Rank	Country	Share (%)	Country	Share (%)	Country	Share (%)	Country	Share (%)
1	Iraq	99.99*	Republic of the Congo	51.7	Republic of the Congo	50.0	Iraq	89
2	Venezuela	97.68*	Iraq	45.7	Iraq	45.4	Equatorial Guinea	81
3	Algeria	96.11*	Libya	43.4	Kuwait	42.4	South Sudan	78
4	Brunei Darussalam	95.56	Kuwait	43.1	Libya	42.5	Oman	76
5	Libya	95.40	Timor-Leste	33.4	Timor-Leste	33.4	Libya	72
6	Nigeria	94.11	Equatorial Guinea	32.2	Saudi Arabia	25.1	Bahrain	72
7	Angola	92.42	Saudi Arabia	29.4	Oman	28.7	Saudi Arabia	69
8	Azerbaijan	91.74	Oman	29.2	Angola	26.9	Kuwait	67
9	Kuwait	90.90	Azerbaijan	29.1	Azerbaijan	25.3	Azerbaijan	64
10	Qatar	86.13	Angola	26.4	Equatorial Guinea	25.6	Angola	56

Notes: ** Last data available (Iraq: 2016, Venezuela: 2013, Algeria: 2017).*

Color code: *Blue (low- and middle-income countries), green (high-income countries), classification according to World Bank.*

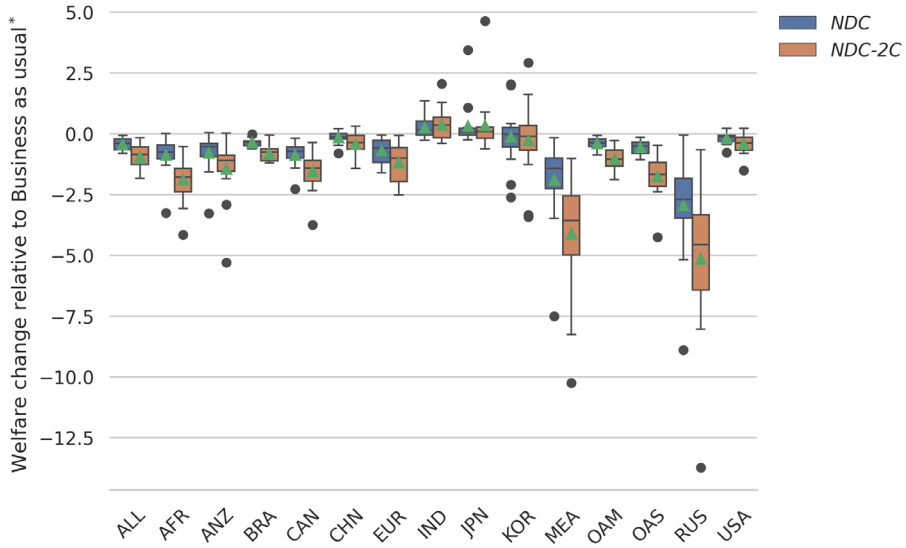
Sources: *World Bank Indicators online; for fiscal dependency: Carbon Tracker (2021), p. 30, and website (https://carbontracker.org/reports/petrostates-energy-transition-report/).*

TABLE 2: TOP 10 FOSSIL FUEL PRODUCERS IN 2018

	Oil (Global production per year: 4630 million tons / 194 EJ)		Gas (Global production per year: 3938 billion cubic meters / 157 EJ)		Coal (incl. thermal, lignite, metallurgical) (Global production per year: 7500 million tons / 163 EJ)	
Rank	Country	Market Share (%)	Country	Market Share (%)	Country	Market Share (%)
1	United States	18	United States	22	China	44
2	Saudi Arabia	12	Russia	18	India	10
3	Russia	11	Iran	6	United States	9
4	Canada	5.3	Canada	5	Indonesia	7
5	China	4.8	Qatar	4.5	Australia	6
6	Iraq	4.6	China	4.1	Russia	5
7	Iran	4.4	Australia	3.1	South Africa	3.4
8	United Arab Emirates	3.8	Norway	3.2	Germany	2.2
9	Brazil	3.4	Algeria	2.5	Poland	1.6
10	Kuwait	2.9	Saudi Arabia	2.4	Kazakhstan	1.4

Color code: *Blue (low- and middle-income countries), green (high-income countries), classification according to World Bank.*

Sources: *OECD IEA Energy Statistics online, EIA Statistics online.*



Regional keys: *ALL – Global average; AFR – Africa; ANZ – Australia and New Zealand; BRA – Brazil; CAN – Canada; CHN – China; EUR – Europe; IND – India; JPN – Japan; KOR – South Korea; MEA – Middle East; OAM – Other America; OAS – Other Asia; RUS – Russia; USA – United States.*

Figure 1: *Regional welfare changes for reaching the NDCs / 2 °C compatible targets (NDC-2C) in 2030 – results from a multi-model study (Böhringer et al., 2021).*

** Measured as change in Hicksean Equivalent Variation (HEV) rel. to HEV in the Business as Usual scenario without further climate policies.*

Note: *The results stem from 15 multi-regional, multi-sectoral computable-general-equilibrium (CGE) models. Box-Whisker Plot shows the median (line), mean (green triangle), the first and third quartile (box), and Whiskers showing the last data points within 1.5 times the interquartile range (IQR). Dots indicate outlier results of models. NDCs as of 2020.*

curse concept which argues that countries can lose welfare on the aggregate level from being richly endowed with resources notwithstanding elites that can appropriate the resource rents (van der Ploeg, 2011). Global climate policies could offer a chance in the long run to overcome institutional regimes that favor rent-seeking behavior and to establish regimes that actually benefit the population (see section 4). Yet in the short and medium term, if resource revenues are threatened to run dry, regime survival and even regional security are at stake with potential global spillovers (e.g. Ansari, 2016; Colgan, 2015).

In addition to the wide-spread poor institutions, resource-rich countries suffer from macroeconomic volatility transmitted from global fossil fuel markets. In particular, oil-rich countries see their GDP – and related variables such as state budget, unemployment, etc. – zigzag with the global oil price. In addition, the strong dependency on fossil fuels leads to a phenomenon often called the "Dutch Disease" where the role of fossil fuels is so dominant that they strongly affect the external trade balance and the currency exchange rate.[2] Even if the exchange rate is not heavily affected, resource-dependent countries often experience a pull of capital and labor into the fossil sector, such that other sectors cannot compete anymore with the renumerations in the fossil sector. Australia and Norway are prominent contemporaneous examples where wages and dividends earned in the fossil resource sectors are far more attractive than in other sectors. This can potentially weaken other sectors, inhibit their development and, in the extreme case, lead to de-industrialization.

Lower global demand for fossil fuels is not only a threat to the level of resource rents and the established distribution channels, it will also lead to a loss in value of those productive assets that are used for the extraction and sales of fossil fuels.

2 The Netherlands were one of the first countries where this phenomenon has occurred; therefore, the name "Dutch Disease".

This phenomenon is known as "asset stranding" (Caldecott, 2017). It affects countries relying on fossil fuel revenues as well as companies that have built their business models on the extraction and sales of fossil fuels. The threat of asset stranding is a strong motivation for opposing climate policy and needs to be taken into account when designing climate policies that should embrace potential losers from climate policies.

The devaluation of assets can pertain to fossil fuel reserves and resources in the ground, but also to fossil fuel infrastructure such as productive capital (coal mines, oil wells, natural gas platforms), fossil fuel transportation infrastructure (that is usually asset-specific and cannot be used for other purposes, e.g. oil pipelines), but also company assets (e.g. company shares). There is no standard definition of stranded assets and they can affect both today's existing assets but also future assets for which investment decisions are based on the expectation of "mild" climate policies ("stranded investments").

As mentioned in the introduction, McGlade and Ekins (2015) calculated that 35 % of the global oil reserves, 52 % of the global gas reserves and a staggering 88 % of the global coal reserves would have to stay in the ground if a 2 °C target is to be met. The different resource-rich regions of the world are, of course, affected quite differently because many factors influence the risk of facing stranded assets: their competitiveness in the world market, competition from alternative energy sources, and also the ambition level of climate policy in the markets. Focusing on productive assets and differentiating by fuel, Ansari and Holz (2020) calculated a stranded asset risk indicator for several resource-rich countries/regions. They found that coal in China has the highest risk associated with asset stranding, but that oil from South America and also the Middle East follows closely (**Figure 2**). These high indicator levels arise, first, because the dependency on these fuels is high in these regions, and, second, because their asset utilization is substantially lower in climate policy scenarios.

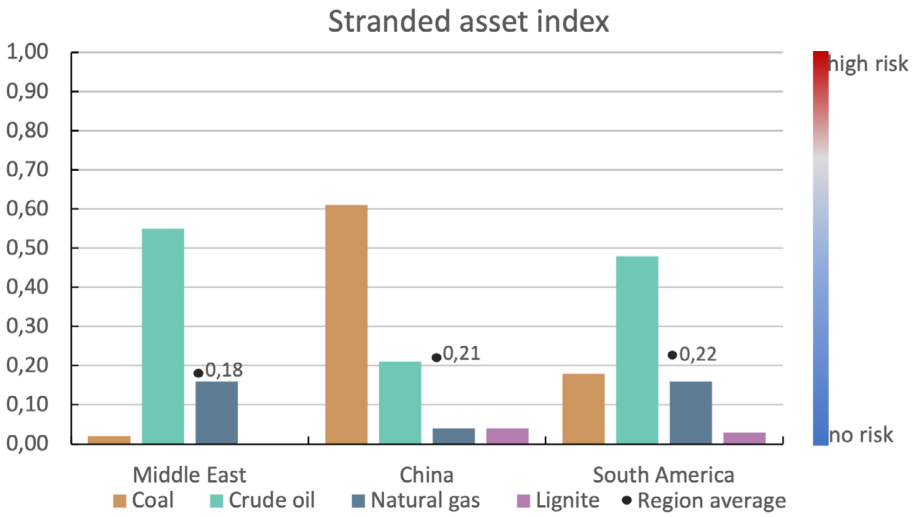


Figure 2: *Stranded asset indicator for coal, oil, and natural gas in the Middle East, China, and South America (Source: Ansari and Holz, 2020).*

Finally, resource-rich countries often suffer from inefficient energy use which has multiple facets. Very prominently, resource-rich countries often provide very low fossil fuel prices for their population, not only thanks to low taxes but in many cases also due to fossil subsidies. This way, the population can benefit to some (small) extent from the resource endowment and is less likely to challenge the (usually intransparent) allocation and unequal distribution of the resource rents to a small elite.

Fossil subsidy removal could be a "low-hanging fruit" climate policy by creating more efficient price signals. However, the political economy of fossil fuel subsidy removal undermines and counteracts this hope as evidence from Latin America suggests (Montes de Oca et al., 2021). In this region, presidential regimes prevail in which all policy changes are attributed to presidential decisions. Looking at the past two decades, fossil subsidy phase-out policies led to a significant reduction of presidential popularity, even though this effect was somewhat smaller in case of gradual phase-outs with small steps (Mexico) than in one-shot phase-outs with a full removal being attempted (Bolivia). Used as a distribution policy, fossil subsidies therefore tend to lock-in resource dependency. In combination with state ownership of fossil companies and lack of market competition they may also secure employment for large parts of the population.

3. THE AMBITION OF CURRENT NDCS AND THE POTENTIAL FOR RATCHETING UP

Stringent international climate policy that reduces exports of fossil fuels will result, as described above, in large economic losses for resource-rich countries. One could thus expect that submitted NDCs of many resource-rich countries are not very ambitious. Yet, as both a multi-model study (Böhringer et al., 2021) on the implications of the Paris Agreement as well as a recent survey among roughly 1000 negotiators and IPCC Lead Authors (Dannenberg and Lumkowsky, 2021) shows, the picture is more complex. **Table 3** lists results of these studies as far as they concern the resource-rich countries listed in either Table 1 or Table 2. Column 1 shows the average simulated implicit carbon prices of reaching the originally submitted NDCs for 2030 in the multi-model study on the Paris targets. Columns 2 to 4 are survey results on the ambition level of the NDCs, on the confidence that these will indeed be reached and on expectations that countries will become carbon neutral in 2050. We only include countries where there were at least five valid answers for at least one question and for columns 2 and 3 we do not consider the responses of the negotiators for their home country.

Column 1 and 2 are both related to the ambition level of the originally submitted NDCs for 2030. They show consistently that the ambition level of the NDCs of resource-rich countries Australia, Russia and Saudi Arabia is lower than that of the EU and as the average for all countries covered in the studies. The modeling study also suggests that this holds true more generally for resource-rich countries in the Middle East. The modeled implicit carbon price furthermore indicates that the ambition level of China and India is low, but the survey participants consider the level as slightly above average, even though still significantly lower than that of the EU. For the US and Brazil, the survey shows below average ambitions, while the modeling study results in a slightly above average carbon price for the US and a very high carbon price for Brazil. The latter result has to be treated with care though, since land-use emissions are not covered

TABLE 3: ASSESSMENT OF SUBMITTED NDCS OF RESOURCE-RICH COUNTRIES

Country / Region	NDC Ambition-Level		(3) Perceived confidence in reaching NDC (on a scale of 1 to 5)	(4) Expectation on carbon neutrality by 2050 (on a scale of 1 to 5) Number of answers in [ ]
	(1) Average Simulated 2030 carbon price of NDC in USD/t CO_2	(2) Perceived ambition level of NDC (on a scale of 1 to 5)		
Australia	20.3 (+ New Zealand)	2.6	3.0	3.3 [18]
Brazil	99.0	2.4	2.2	3.1 [34]
Canada	64.8	–	–	3.2 [24]
China	8.6	2.8	3.0	3.6 [5]
Germany	125.2 (EU)	–	–	4.0 [49]
India	8.3	2.7	2.6	3.2 [10]
Indonesia	–	–	–	3.3 [10]
Nigeria	–	–	–	2.2 [14]
Norway	–	–	–	3.9 [15]
Poland	125.2 (EU)	–	–	3.1 [15]
Russia	6.5	2.1	2.4	1.3 [3]
Saudi Arabia	13.7 (Middle East)	2.0	2.3	–
South Africa	–	2.8	2.8	2.4 [8]
United States	38.7	2.1	2.3	3.1 [58]
EU	125.2	3.8	3.7	3.7 [183]
Global Average	32.4	2.6	2.7	3.1

Column (1): *Mean and median carbon price simulated for unilaterally reaching the submitted NDC 15 different computable general equilibrium models from leading international modeling teams.*

Column (2): *Mean of answers on a scale of (1) Not ambitious at all – (5) Very ambitious to the question: "Please evaluate the ambition of the current NDCs submitted under the Paris Agreement by the following countries or group of countries. Please think of ambition of the NDC relative to a country's economic strength."*

Column (3): *Mean of answers on a scale of (1) Not confident at all – (5) Very confident to the question "How confident are you that the following countries or group of countries will fulfill their current NDC submitted under the Paris Agreement?". Assessment from negotiators and scientists from the respective countries or country groups were excluded.*

Column (4): *Mean of answers on a scale of (1) Not confident at all – (5) Very confident to the question "How confident are you that by 2050 your home country will be able to replace fossil fuels to a large extent by alternative energy sources?"*

Sources: *Column (1): Böhringer et al. (2021); Column (2)–(4): Dannenberg and Lumkowsky (2021).*

in the models and the translation of the Brazilian NDC into CO_2 emissions reductions covered in the study is based on some strong assumptions. Canadas ambition level is above average according to the modeling study.

Furthermore, column 3 indicates that for many, though not all resource-rich countries, negotiators and scientists are also pessimistic regarding the fulfillment of NDCs. For all countries where results are available, the confidence of the survey participants lags behind the confidence in the EU's efforts and the global average efforts. For Australia, China, India and South Africa the level is at or above the average, but still below that of the EU.

Finally, column 4 shows that negotiators and scientists from all covered resource-rich countries except Norway show higher skepticism about reaching carbon neutrality by 2050 in their own country compared to the EU participants in their respective

countries. Yet, only Russia, South Africa, and Nigeria show clearly higher skepticism than the global average.

The heterogeneity of results implies that reducing resource-rich countries to the resource dimensions only when analyzing climate policy would fall way short of reality. Factors like the respective carbon intensity of production, the state of development and the general attitude of population and the government towards climate change and multilateralism are very likely to have an impact as well.

Another survey, this one among 280 UNFCCC delegates who participated in the COP24 (Mahabadi and Achtnicht, 2021) reveals reasons for some of the low ambition levels and pessimism about even meeting these targets. In general, "high costs of reducing GHG emissions" is the most probable reason to have led all or most Parties (not only resource-rich countries) to submit inadequate NDCs to reach the 2 °C target. This is followed by "Unsolved climate finance issues" and "Higher costs of ambitious NDCs than local benefits". Among all delegates, those representing the resource-rich countries Angola, Botswana, Brazil, Canada, China, Republic of the Congo, Guinea, Nigeria, Sudan, Tanzania, USA and Zambia find all three reasons for submitting inadequate NDCs more important than delegates of non-resource-rich countries. Given the economic challenges described in section 2, it is not surprising that these two cost categories feature high on resource-rich countries' list. The above-average importance of unsolved climate finance issues hints at one possible solution to achieve higher reductions in these countries.

The Paris Agreement will take stock of the NDCs every five years. This stock take assesses the success in fulfilling the NDCs and in the gradual ratcheting up of ambitions. The decisive question – not only for the resource-rich countries – is whether this mechanism can ensure that global emission reductions in line with the Paris temperature targets are reached. The expectations about this are mixed. On the one hand, in the survey among UNFCCC delegates (Mahabadi and Achtnicht, 2021), more than half of the delegates believe that the Paris Agreement's bottom-up approach and ratcheting mechanism performs better than the Kyoto Protocol's top-down approach. On the other hand, the ratcheting mechanism itself might cause low initial NDCs. As countries already know that they will have to increase ambitions in the future, this might reduce incentives to submit high initial targets. Gallier and Sturm (2021) confirm this in a public good experiment in which the ratchet mechanism leads to only 50 % of the contributions (which can be interpreted as emission reduction promises) compared to a situation without ratcheting.

Overall, especially low- and to some degree also middle-income resource-rich countries show below average ambition in their current NDCs and are less certain to even reach these targets. High costs, also in comparison to local benefits, are important reasons for this. The ratcheting mechanism alone will be not sufficient to raise ambitions in resource-rich countries.

4. ECONOMIC PERSPECTIVES BEYOND FOSSIL FUEL EXPORTS

Economic diversification away from the sole focus on fossil fuel extraction is the most promising strategy to overcome the resource curse. Even though economic diversification is a blurry concept, diversification is the chance for resource-rich countries to escape the resource curse trap (e.g. Ansari and Fareed, 2020). The establishment of other sectors reduces the dependency and volatility risk from the resource sector and helps mitigating the negative effects of capital and labor concentration in the resource sector. Moreover, other sectors such as the manufacturing sector usually have higher productivity and value added than fossil resource extraction activities, thereby fostering economic growth. With these benefits, diversified economies are also better equipped to engage in climate policy than resource-dependent countries.

Successful historical examples of economic diversification are the aluminum industry in Norway and the petro-chemical industry in the USA where new (manufacturing) industries were attracted by the availability of resources and energy. These examples show that diversification does not guarantee a lower CO_2 footprint but is a chance to reduce the risks related to the resource curse, the Dutch Disease and oil price volatility. However, these examples also show that opportunities arising from fossil fuel extraction and the resource rents can well be used for the economic transformation.

Moreover, investing in green technologies such as renewable electricity or renewable gases (hydrogen) are chances to respond to climate policy requirements while at the same time reducing the fossil dependence. In some cases, such as hydrogen, the newly emerging sectors can be an opportunity for the incumbent fossil fuel suppliers to continue to be energy suppliers to the global markets. This opportunity is relevant, for example, for Saudi Arabia and Russia, but also for Australia (van de Graaf et al., 2020).

In sum, there is a sizeable potential for national initiatives to overcome resource dependency and, thereby, become less vulnerable to effects from global climate policy. In reality, however, it is hard to implement such strategies, often because ruling elites who stand to lose from a system change are unwilling to lead the change from within. Yet, a generalized increase in the global ambition level as well as credible greenhouse gas neutrality targets in fossil fuel importing countries will put increasing pressure for change on fossil fuel dependent countries.

5. POLICY OPTIONS TO INCENTIVIZE AN INCREASE OF CLIMATE AMBITIONS IN RESOURCE-RICH COUNTRIES

In the economics literature a number of different policy options are discussed in order to incentivize countries to become more ambitious in their climate policies. On a fundamental level, these options can be distinguished in policies that aim at reducing the demand for fossil fuels (so-called demand-side policies) and policies that target the extraction decision of resource owners directly (so-called supply-side policies).

While demand-side policies like CO_2 pricing are not designed specifically with resource-rich countries in mind, they still affect their decision on how (and if) to implement their NDCs. Supply-side policies on the other hand target resource owning countries specifically. In contrast to demand-side policies, supply-side policies have only recently become a research focus in economists. Yet, some researchers even propose that they should complement the Paris Agreement (Asheim et al., 2019). Supply-side

policies include, for example, moratoria on new coal mines and deposit markets but also supporting especially poor resource-rich countries technologically or financially.

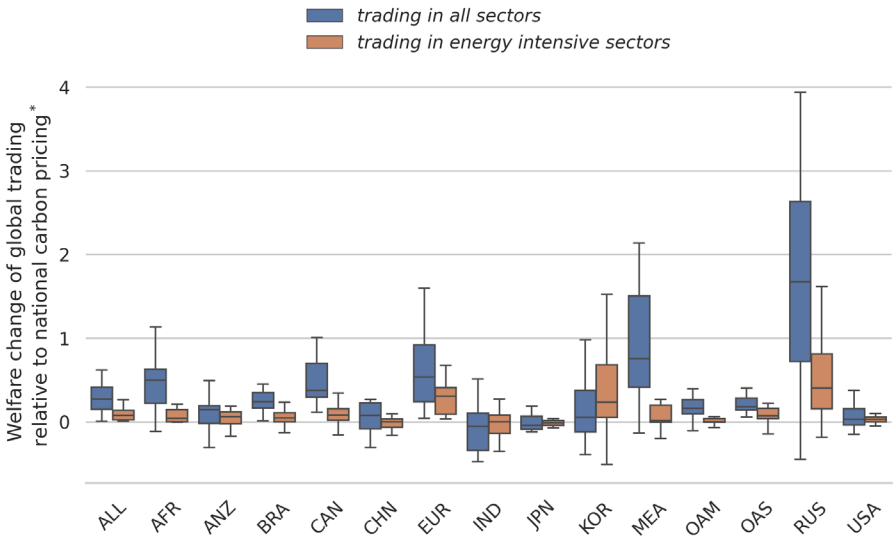
In the following, some demand- and supply-side policies that are discussed on a global or at least multinational level are presented.

Demand-Side Policies

Global carbon pricing: Carbon pricing in the form of CO_2 taxes or emissions trading is probably the most prominently discussed and widely implemented demand-side policy. While it can be implemented on a national level, implementing it on a global scale can reduce the global welfare costs of reaching the NDCs.

Consider the following example with two policy options for countries to implement their NDCs (Böhringer et al., 2021): Signatories of the Paris Agreement can either reach their NDCs through national policies or they can harmonize their CO_2 prices globally. If this harmonization is implemented through a global emission trading system, emission rights are allocated to the individual countries according to their NDCs.

Figure 3 depicts the relative change in welfare due to reaching the global emission reduction implied in the NDCs through globally harmonized carbon prices compared to reaching them through national carbon pricing. The figure shows that while most regions fare better with globally harmonized prices, it is the resource-rich regions Russia and MEA who gain most from policy harmonization under current NDCs as coal demand is reduced while demand for gas and oil increases. This holds for globally harmonized CO_2 prices across all sectors and fuels (blue columns) as well as for scenarios in which only prices in energy intensive (including the power sector) are globally harmonized (orange columns).



Regional keys: *ALL – Global average; AFR – Africa; ANZ – Australia and New Zealand; BRA – Brazil; CAN – Canada; CHN – China; EUR – Europe; IND – India; JPN – Japan; KOR – South Korea; MEA – Middle East; OAM – Other America; OAS – Other Asia; RUS – Russia; USA – United States.*

Figure 3: *Difference in regional welfare costs in 2030 for a globally harmonized carbon price (trading in all sectors) / a harmonized carbon price in energy intensive sectors and the power sector (trading in energy intensive sectors) compared to reaching the NDCs through national carbon pricing only – results from a multi-model study.*

** Measured as Hicksean Equivalent Variation (HEV) in percent of HEV in the Business as Usual scenario without further climate policies.*

Note: *The results stem from 15 multi-regional, multi-sectoral computable-general-equilibrium (CGE) models. Box-Whisker Plot shows the median (line), the first and third quartile (box), and Whiskers showing the last datapoints within 1.5 times the interquartile range (IQR).*

Note, however, that gaining in comparison to national policies does not necessarily imply that the overall welfare effects of reaching the NDC's will be positive (see Figure 1). As countries' potential welfare losses decrease, however, the likelihood of implementing and reaching the NDCs might rise (recall the assessment of resource-rich countries reaching their NDCs in Table 3). Yet, the fundamental problem of countries setting their NDCs strategically low (as described in section 3) might not be solved by such a global system. Also, if not all countries enter a CO_2 pricing coalition, CO_2 pricing is prone to leakage which not only reduces its effectiveness but also increases its costs to the members of the coalition.

- ***Climate clubs:*** In order to prevent potentially negative welfare effects to the members of a CO_2 pricing coalition, Nordhaus (2015) suggests the formation of so-called climate clubs. Members of these clubs on the one hand implement a harmonized CO_2 price and on the other hand impose trade sanctions on non-member countries. These sanctions provide incentive for countries which are initially outside the coalition to join it.

  Hagen and Schneider (2017) show, however, for such sanctions to stabilize coalitions and induce positive welfare effects, the coalitions have to be of sufficient size if outsiders react with retaliatory trade measures (which is excluded from Nordhaus' analysis by assumption). Gaining the support of resource-rich countries in addition to large fossil fuel importers like the EU might be crucial in this context.

  The decision to join or not to join – not only but also for resource-rich countries – would depend crucially on whether becoming a member of a climate club and implementing harmonized CO_2 prices would lead to welfare gains compared to national policies or even compared to not reaching their NDCs at all. An analysis that is comparable to the previously presented comparison of welfare effects in the case of national policies and global CO_2 prices would be interesting in this context. If the results of coordinating policies inducing higher welfare prevail, countries with high climate policy ambitions like the EU, China and, as of recently, the US could be joined by resource-rich countries like Russia to form a coalition that covers a large share of fossil fuel demand and leaves relatively little room for carbon leakage. Other resource-rich countries could find it welfare-improving to join the coalition rather than conducting national policies.

Supply-Side Policies

- ***Mine moratoria:*** Mine moratoria that restrict the expansion of mining capacity, especially in the coal sector, are increasingly in the focus as practical climate policies to limit the extraction of ever more fossil fuels without putting strain on existing extraction paths and businesses. Just recently, a large part of the population in the Australian Hunter Valley responded in a survey that they would favor a moratorium to coal mining in their region (Sydney Morning Herald, 2021). Moreover, mine moratoria are usually part of coal phase-out programs, e.g. in Germany, thereby allowing for the continued extraction in already open mines but prohibiting the opening of new mines. Mendelevitch (2018) calculated that a mine moratorium would reduce global coal production by more than 40 % compared to today – as opposed to a stable global production in an NDC business-as-usual scenario.

- ***Compensation payments:*** A problem of a large-scale and international mine moratorium might be that the induced reduction of coal supply could increase coal prices. This, in turn, would create incentives for the owners of coal reserves not to join such a moratorium and even raise extraction. Carbon leakage through this so-called energy market channel can render such a moratorium less effective. In such cases, compensation payments for leaving resources in the ground might create additional incentives to join the moratorium but, if anticipated, might also create strategic incentives not to join without compensation. In case of poor resource-rich countries, however, compensation payments, might be the only way to get these countries on board by providing them also with the means to transform their economy and increase decarbonization ambitions.

  To date, the only large-scale experience with such a policy was the Yasuni-ITT initiative in Ecuador. While this initiative ultimately failed, much can be learnt from this failure about its design (WBGU, 2021), for example regarding buying versus leasing deposits (Eichner et al., 2021).

- ***Deposit markets:*** The idea to compensate resource owners for leaving resources in the ground is also discussed in the form of deposit markets. In theory, actors can trade the right to exploit fossil fuels on such markets (Bohm, 1993). Countries willing to reduce emissions can buy resources from resource-rich countries reluctant to implement climate policies.

  The economics literature on this topic has increased considerably in recent years. It shows that while the efficiency of deposits markets depends on market power structures (Eichner and Pethig, 2017), they are preferable to unilateral climate policies even if implemented for more than one resource type (Vogt et al., 2021). However, while deposit markets might be efficient from a theoretical point of view, the induced large-scale transfers to resource owners are not only prone to moral hazard problems but also hard to sell to constituents in importing countries, especially when wealthy resource-rich countries are concerned. So, if and how such markets might be implemented in the future remains to be seen.

- ***Support for poor resource-rich economies:*** In addition to supply-side policy approaches that are in general applicable to all resource-rich countries, further measures have to be taken to enable and incentivize for poor resource-rich economies to lower their extraction of fossil fuels – as in the case of compensation payments suggested above.

  As section 3 showed, unresolved climate finance issues are among the most important reasons for low climate ambitions. In addition to overcoming resource-curse related challenges, poor resource-rich countries also face similar problems in transitioning to low carbon pathways as developing countries (see also Marz and Steckel, 2021). For these countries, outside financing but also support of sustainable development in a more general context, e.g. regarding institutional reforms, education & research and technology transfers, are crucial issues to raise their climate ambitions. This holds especially in the wake of the COVID-19 pandemic. Low-income countries currently find themselves with little means to overcome the economic repercussions of the crisis. At the end of 2020, high-income countries committed almost 10 % of their GDP to stimulus packages while low-income countries were devoting only about 3 % to such programs (UN, 2021). On a per capita basis, it is estimated that stimulus spending in high-income countries is about 580 times higher than in low-income countries (UN DESA, 2021).

Resource-rich countries may also face more problems with issuing government bonds in the future, as investor newsfeeds are starting to include climate (policy) risk in sovereign risk assessments (see e.g. FTSE Russel, 2021). Of course, pressure from financial markets may also act as a driver towards decarbonization. Diverting finances to low-income countries with a focus on overcoming resource dependencies and fostering green investment, can not only help overcoming the COVID crisis but also to put these countries on a more sustainable future path.

Which role the outlined demand- or supply-side policies will ultimately play in raising climate ambitions in resource-rich countries, cannot be foreseen with certainty and depends not only on economic implications but also on politics and international negotiations. It should not be forgotten that for resource-rich countries much is at stake and climate protection will come at a cost – at least in the short and medium term. Europe as well as other high-income regions should take the concerns especially of poor resource-rich economies serious and combine effective climate policy approaches with cooperation and support in overcoming resource dependencies.

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